

【CLAIMS】**【Claim 1】**

A method for separating mixed signals into component signals comprising the steps of:

- (a) producing current frames from said mixed signals (302);
- 5 (b) separating said current frames into component signals of the current frame (303);
- (c) transforming said component signals using nonlinear functions into nonlinear-transformed signal (304);
- (d) computing aliasing-free normalized cross-power spectra of said component signals and said nonlinear-transformed signals in (c) (305);
- 10 (e) computing natural gradient using said cross-power spectra (310);
- (f) updating separating filter coefficients using said natural gradient (311);
- (g) normalizing said separating filter coefficients (312);
- (h) determining convergence conditions and iterating from (a) to (g) until convergence (313); and
- 15 (i) separating said mixed signals into component signals using said separating filter coefficients after convergence (314).

【Claim 2】

The method of claim 1 wherein step (b) further comprises the substeps of:

- 20 (b1) transforming said mixed frames and said separating filter coefficients into the frequency domain;
- (b2) computing component signals in the frequency domain; and thereby transforming said component signals back into the time domain; and
- (b3) zeroing the first L samples of said component signals; thereby producing component
- 25 signals.

【Claim 3】

The method of claim 1 wherein step (d) further comprises the substeps of:

- 30 (d1) transforming said component signals and said nonlinear-transformed signals into the frequency domain;
- (d2) computing cross-power spectra using said component signals and said nonlinear-transformed signals in the frequency domain (306);
- (d3) computing power spectra of said component signals and the power spectra of nonlinear-transformed signals (307);
- 35 (d4) computing normalized cross-power spectra (308); and

(d5) transforming said normalized cross-power spectra back into the time domain; and applying the time domain constraint for preserving only the first L samples (309).

【Claim 4】

5 The method of claim 1 wherein step (e) further comprises the substeps of:

(e1) applying the nonholonomic constraints to said aliasing-free normalized cross-power spectra; and

(e2) computing said natural gradient using said separating filter coefficients and said nonholonomic-constrained cross-power spectra.

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【Claim 5】

An apparatus of claim 1 to claim 4 for separating a plurality of the mixed signals into a plurality of component signals using the frequency-domain normalized multichannel blind deconvolution method.

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【Claim 6】

【Claim 7】

20 A computer readable storage medium of claim 1 to claim 4 containing a program that, when executed upon a general purpose computer system, causes said general purpose computer system to become a specific purpose computer system that separates a plurality of the mixed signals into a plurality of component signals using the frequency-domain normalized multichannel blind deconvolution method.